New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **CARBON MONOXIDE**

CAS Number: 630-08-0
DOT Number: UN 1016
UN 9202 (cryogenic liquid)

RTK Substance number: 0345
Date: June 1992 Revision: May 1998

HAZARD SUMMARY

* **Carbon Monoxide** can affect you when breathed in.
* Exposure during pregnancy can cause lowered birth weight in offspring.
* Exposure to **Carbon Monoxide** can cause headache, dizziness, lightheadedness and passing out. Lower levels can affect concentration, memory and vision, and loss of muscle coordination.
* Extremely high exposure levels can decrease the ability of the blood to carry oxygen. This can cause a bright red color to the skin and mucous membranes (formation of *carboxyhemoglobin*), and coma with convulsions and death.
* Skin contact with liquid **Carbon Monoxide** can cause frostbite.
* **Carbon Monoxide** is a HIGHLY FLAMMABLE GAS and a DANGEROUS FIRE HAZARD.

IDENTIFICATION

Carbon Monoxide is a colorless, odorless gas or a liquid under high pressure. It is used in separating metals from their ores (metallurgy) and in making other chemicals. It is usually found as a waste product of incomplete combustion.

REASON FOR CITATION

* **Carbon Monoxide** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH and NFPA.
* This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20**.**
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **50 ppm** averaged over a 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **35 ppm** averaged over a 10-hour workshift and **200 ppm** not to be exceeded at any time.

ACGIH: The recommended airborne exposure limit is **25 ppm** averaged over an 8-hour workshift.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* **Carbon Monoxide** alarm detection systems should be installed in work areas to warn of dangerous exposure levels.
* Wear specially designed protective clothing when exposure to cold equipment, vapors or liquid **Carbon Monoxide** can occur.
* Wear protective clothing made of material that does not generate static electricity.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Carbon Monoxide** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Carbon Monoxide**:

* Exposure to **Carbon Monoxide** can cause headache, dizziness, lightheadedness and passing out.
* Exposure to lower levels can affect concentration, cause memory and vision problems, and loss of muscle coordination.
* Extremely high exposure levels can decrease the ability of the blood to carry oxygen. This can cause a bright red color to the skin and mucous membranes (formation of *carboxyhemoglobin*), and coma with convulsions and death.
* Skin contact with liquid **Carbon Monoxide** can cause frostbite.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Carbon Monoxide** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health, **Carbon Monoxide** has been tested and has not been shown to cause cancer in animals.

Reproductive Hazard

* Exposure to **Carbon Monoxide** among pregnant women can cause lowered birth weight and nervous system damage in the offspring.

Other Long-Term Effects

* **Carbon Monoxide** can cause heart disease and damage to the nervous system.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater), the following is recommended before beginning work and at regular times after that:

* Carboxyhemoglobin (a complex of **Carbon Monoxide** with hemoglobin) should be tested for within a few hours after exposure to the gas.
* EKG
* Exam of the nervous system

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

* Exposure to *Methylene Chloride* can increase the blood level of *carboxyhemoglobin* and increase the risk of **Carbon Monoxide** poisoning.
* Smoking increases your exposure to **Carbon Monoxide**. Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems. Exposure to **30 ppm** of **Carbon Monoxide** throughout the day is equivalent to smoking 20 cigarettes a day.

Conditions Made Worse By Exposure

Individuals who already have heart disease should not be exposed to levels of **Carbon Monoxide** above **35 ppm**.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Before entering a confined space where **Carbon Monoxide** is present, check to make sure sufficient oxygen (19%) exists.
* Before entering a confined space where **Carbon Monoxide** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* **Carbon Monoxide** workplace alarm systems should be installed where **Carbon Monoxide** is present to warn of potentially dangerous levels.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* If liquid **Carbon Monoxide** is splashed onto clothing, change into clean clothing promptly.
* On skin contact with liquid **Carbon Monoxide**, immediately wash or shower to remove the chemical.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with liquid **Carbon Monoxide**. Wear protective gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* Where exposure to cold equipment, vapors, or liquid may occur, employees should be provided with special clothing designed to prevent the freezing of body tissues.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with the liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposure over **25 ppm**, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to **1,200 ppm** is immediately dangerous to life and health. If the possibility of exposure above **1,200 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **Carbon Monoxide** you should be trained on its proper handling and storage.
* **Carbon Monoxide** reacts with STRONG OXIDIZERS (such as CHLORINE, CHLORINE DIOXIDE, BROMINE TRIFLUORIDE, CHLORINE TRIFLUORIDE, and LITHIUM).
* Keep cylinders in a cool, well-ventilated area away from HEAT, FLAME, and SUNLIGHT.
* Metal cylinders or tanks involving the transfer of liquid **Carbon Monoxide** should be grounded and bonded.
* Use only non-sparking tools and equipment, especially when opening and closing cylinders or tanks of **Carbon Monoxide**.
* Sources of ignition such as smoking and open flames are prohibited where **Carbon Monoxide** is used, handled, or stored.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: But aren't pregnant women at the greatest risk from reproductive hazards?
A: Yes. Pregnant women, the young and elderly are more susceptible.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: **CARBON MONOXIDE**
DOT Number: **UN 1016**
UN 9202 (cryogenic liquid)
NAERG Code: **119**
168 (cryogenic liquid)
CAS Number: **630-08-0**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	4
REACTIVITY	-	0
FLAMMABLE GAS CONTAINERS MAY EXPLODE IN FIRE MAY CAUSE SUFFOCATION		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Carbon Monoxide** is a FLAMMABLE GAS that can cause an explosion.
* Stop the flow of gas.
* Use dry chemical extinguishers. Water can be used to keep fire-exposed containers cool.
* CONTAINERS MAY EXPLODE IN FIRE.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Carbon Monoxide** is leaked, take the following steps:

* Evacuate and isolate the area of the leak and persons not wearing protective equipment from area of leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of leak to disperse the gas.
* Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.
* Keep **Carbon Monoxide** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the buildup of explosive concentrations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

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FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

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HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-764-7661

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* In case of contact with liquid **Carbon Monoxide**, immerse affected part in warm water. Seek medical attention.

Breathing

* Immediately remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.
* Medical observation is recommended for 24 to 48 hours after breathing overexposure.

PHYSICAL DATA

Vapor Pressure: Greater than 1 mm Hg at 68^{O}F (20^{O}C)
Water Solubility: Slightly Soluble

OTHER COMMONLY USED NAMES

Chemical Name:
Carbon Monoxide
Other Names:
Carbon Oxide; Exhaust Gas; Carbonic Oxide; Flue Gas

NEW JERSEY DEPARTMENT OF HEALTH AND
SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

>>>>>>>>>>>>>>>>>>> **EMERGENCY INFORMATION** <<<<<<<<<<<<<<<<<<<